INPUT

EXECUTIVE OVERVIEW

Revolutionary Changes in Hospital IT Applications

U.S. Market Analysis Program

To Our Clients:

This summary is an excerpt from a full research report, *Revolutionary Changes in Hospital IT Applications,* issued as part of INPUT's Market Analysis Program. A complete description of the program is provided at the end of this Executive Overview.

If you have questions or comments about this report, please call (415) 961-3300 to contact your INPUT analyst.

Abstract

This report from INPUT's Market Analysis Program analyzes key applications in hospitals and hospital groups.

A survey of 117 U.S. hospitals and hospital groups examined their application-related objectives and plans. A further in depth interview was conducted on 189 critical applications, concerning plans over the next three years. The report provides insights into the replacement schedule of critical applications, the methods planned for implementation of these applications and the expected expenditure on software and services.

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Executive Overview

This study examines the plans of U.S. hospitals for replacing critical applications. This chapter summarizes:

- Total expected spending on critical applications
- Replacement rates for critical applications
- The reasons why applications are being replaced
- The expected sources of these applications
- Technical issues being addressed
- The balance between business and technical objectives in applications decision making
- Overall conclusions and recommendations

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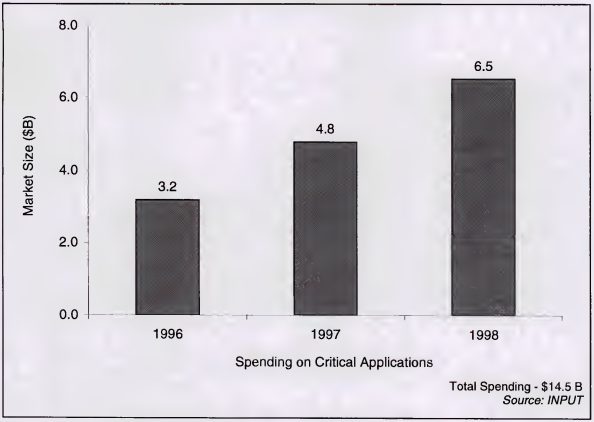
A

Total Spending on Key Applications

Hospitals plan to spend over $14 billion on IT services and software for critical applications over the next three years (Exhibit 1).

Exhibit 1

Spending on Critical Applications by Year



INPUT expects that not all of the planned spending will take place as scheduled; on balance, INPUT does not expect more than 10% of this planned spending to lapse or fall into later time periods.

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B

Replacement Rates for Critical Applications

One reason for the high level of spending is that replacement rates for categories of major applications will be very high over the next three years.

The great majority of respondents expect the replacement to occur in the next three years–which is, after all, near the end of most institutions' planning horizons. The replacement rate is a key metric for both hospitals and vendors.

The research classified applications into the following groupings:

- Patient-related, including
  - Patient accounting systems (including admissions)
  - Patient care (including clinical systems)
  - Integrated patient accounting/patient care systems
- Administrative systems (e.g., purchasing, logistics, HR)
- Ancillary department systems (labs, pharmacy, etc.)
- Medical records (including imaging systems)
- Decision support systems

Patient-related applications (taking separate and integrated patient accounting and patient care systems together) will see replacement rates of nearly 90%.

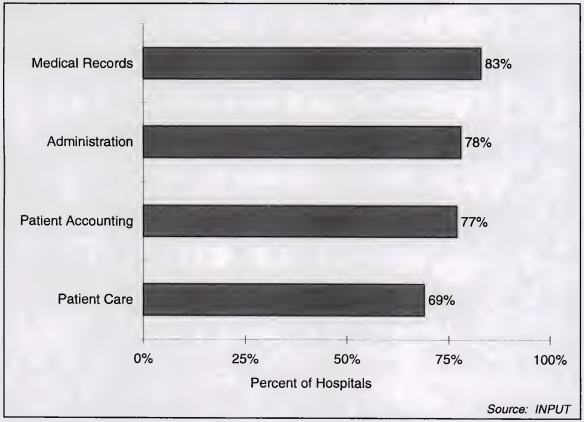
Medical record system replacement is expected to be almost as high.

Decision support applications will have the lowest rate of installation–and these will average almost 60%.

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Exhibit 2

Major Application Replacement Rates



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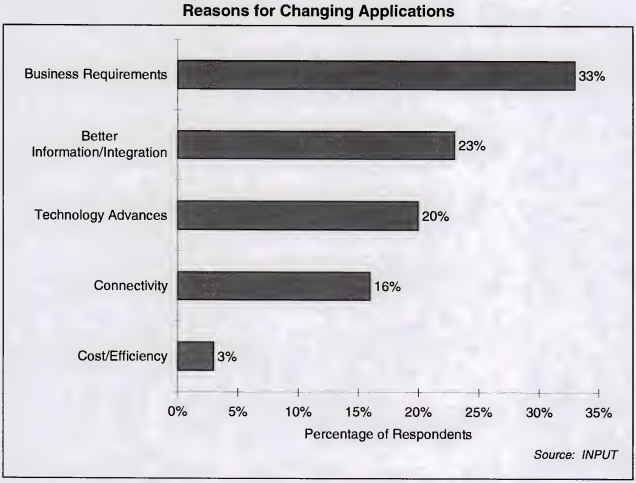
C
Reasons for Replacement

The underlying driver for the high rate of change is, of course, managed care and its impact on the overall health care environment. This is reflected in the reasons hospitals give for making application changes:

- Changing business requirements, especially the pressures of managed care
- The need for better information
- Improved communications

Together, these make up about three-quarters of the reasons given for applications changes (Exhibit 3).

Exhibit 3



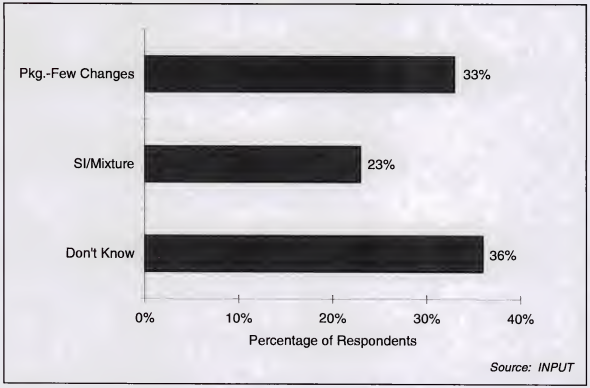
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D
Sources of New Applications

In about two-thirds of applications decision-making situations, the general source for the replacement applications has been identified by the hospital (Exhibit 4).

Exhibit 4

Sources of Major Applications



The main sources expected to be used are packaged software or some form of vendor assistance. For most applications, solely in-house resources will be undertaken for only a small minority of projects.

Package use can be further subdivided into cases in which many changes are expected to be made in the application and those in which the package will be used with few changes.

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Hospitals expect to make significant use of services vendors (i.e., those supplying professional services and systems integration). The vendor to be used has not yet been identified for most planned applications. In many cases, the exact form the services vendor assistance will take is not yet known. The assistance may take several forms:

- Vendors may provide purely professional services, where the vendor works alongside hospital staff or under the direction of the customer.
- In some cases, it is already expected that vendors will supply a fully integrated solution.
- In other cases it is expected that vendors will supply a mixture of services.
- In many cases, services vendors will build on software packages or modules. In these cases, the services component overlaps the packaged software component.

Few hospitals foresee purely in-house custom system development–the business and technical knowledge base required is just too large.

Outsourcing (including processing services) was rarely identified as a separate category. In INPUT's view, this was because:

- Outsourcing is by nature "aperiodic"–that is, it is often not planned, or even known about, far in advance but arises because of a particular set of circumstances within the customer organization.
- The knowledge of outsourcing plans and decisions, if it exists, is often limited to a small set of usually senior people.

The most interesting category, especially from the vendor standpoint is "Don't Know": This presents an opportunity for every type of vendor, especially outsourcing/processing vendors and systems integrators.

E
Business and Technical Objectives in Applications Decision Making

1. Balance Between Technology and Business Objectives

Business needs are clearly driving the applications replacement process; however, technology issues cannot be ignored. The majority of respondents said that they would give a higher weight to business issues as opposed to technical issues when making application change decisions. Obviously, business objectives will be dependent on using appropriate technology.

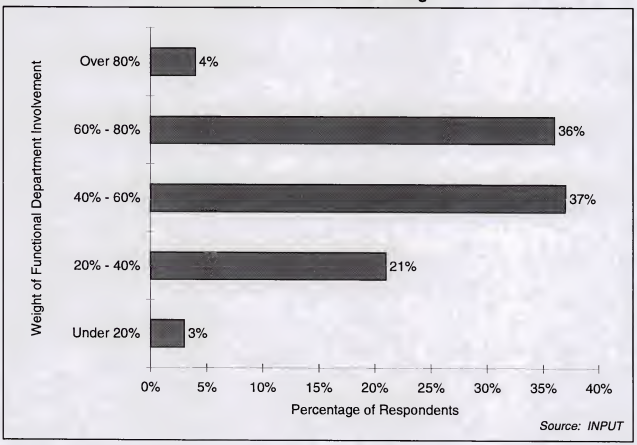
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2. Organizational Location of Decision Making

In a declining number of organizations, the IS group makes the key decisions on new applications.

More common, however, is a sharing of responsibility between the IS department and the functional units involved, as shown in Exhibit 5. The trend is for the functional units to assume more responsibility.

Exhibit 5



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F
Technology Issues

1. Operating Environments

The chief difference between the hospital sectors and many other markets is in hospitals' plans to use UNIX as a principal platform for applications.

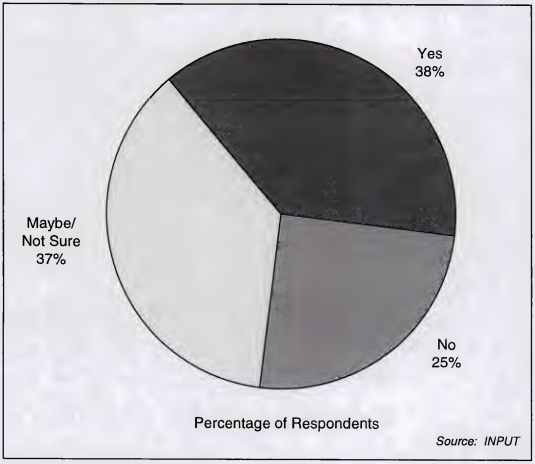
The Microsoft family of operating systems (Windows and NT) is–unusually, in comparison to most other industry sectors–planned as the primary platform by a minority of hospitals. This picture would change somewhat if Microsoft could reverse a high proportion of the "Don't Knows."

2. Object-Oriented Plans

In about a third of future applications, hospitals hope to be able to make use of object-oriented technology (Exhibit 6).

Exhibit 6

Planned Use of Object-Oriented Technology



INPUT believes that, as a group, hospitals will wait for the established product vendors to produce object versions of their products.

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3. The Year 2000

On current plans, most hospitals expect to replace most critical applications before the year 2000. If hospitals are able to maintain this rate of replacement, it is unlikely that the hospital sector will be faced with the high level of "Year 2000" problems that are now being predicted for some organizations.

4. Use of the Internet/Intranets

Only 4% of respondents mentioned the use of the Internet in their technical plans. INPUT believes, however, that this situation will change rapidly as hospitals become more knowledgeable about the Internet and, especially, about Intranet issues.

G
Conclusions and Recommendations

Based on the research for this project, as well as other recent work that INPUT has performed, INPUT has drawn the following conclusions and associated recommendations.

- The high level of application replacements will provide many hospitals with opportunities to make improvements to their systems and the underlying business functions.
- Hospitals will look to third-party vendors for the bulk of this assistance.
- Hospital application strategies are still in a period of transition. This means that hospitals are trying to achieve:
  - Improved efficiency
  - Improved general information
  - Support for provider networks
  - Support for negotiations with managed care organizations

Some applications fill more of these needs than others, as shown in Exhibit 7.

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Exhibit 7

Hospital Application Strategies

Application Type	Efficiency	Information	Processing Network	Managed Care Negotiations
Patient-Related	X	X	X	X
Administrative	X			
Ancillary	X	X	X	X
Medical Records		X	X	
Decision Support	X	X		X

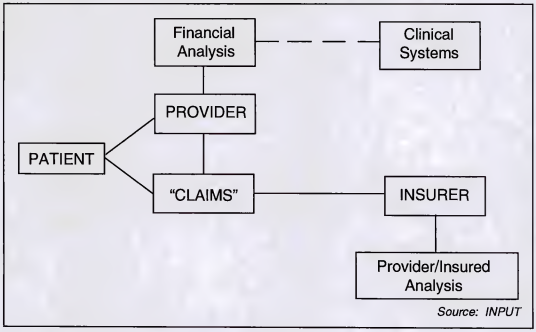
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- The new applications planned may not, however, not be sufficient to support the needs of many hospitals in the new managed care environment.
  - Many, if not most, of these new applications may end up being improved versions of applications that still assume a pre-managed care operating environment. This is the "processing" model shown in Exhibit 8.
  - To operate in a managed care environment will require a much higher level of operational *and* analytic integration.
- This new level of integration is what INPUT terms the "megabase" health care environment (Exhibit 9). We are still at least a year away from many megabase-oriented applications being designed and offered.
- Consequently, it is quite likely that many replacement applications will need to be upgraded or replaced themselves soon after installation.

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Exhibit 8

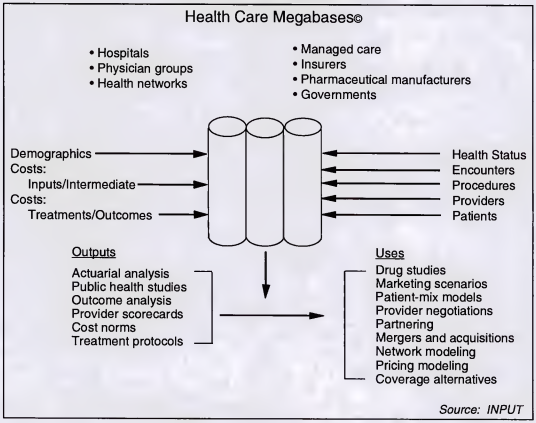
Traditional "Processing" Model



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Exhibit 9

Health Care "Megabases"



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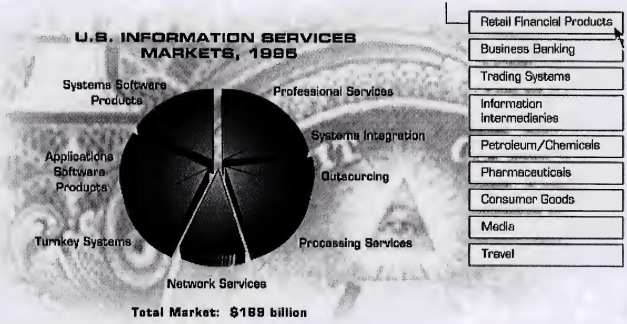
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- **Revolutionary Changes in Hospital IT Applications**
- **IT Directions in the Travel Industry**
- **New Uses of IT in the Media Sector**
- **New Applications to Support Supply Chain Management**
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INPUT, 1881 Landings Drive, Mountain View, CA 94043 U.S.A.
Tel. (415)528-6317 . Fax (415)961-8287 . http://www.input.com . sales@input.com

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Revolutionary Changes in Hospital IT Applications

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Abstract

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Market Analysis Program

Revolutionary Changes in Hospital IT Applications

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I

Introduction

A Overview

This study, from INPUT's Market Analysis Program, examines the plans of U.S. hospitals and hospital groups with respect to IT applications.

This chapter will describe:

- The methodology used for this study
- The analytic approach
- The organization of this report

B Methodology

INPUT interviewed 117 U.S. hospitals and hospital groups in March and April of 1996 to learn of their application-related objectives and plans. The questionnaire used is shown in Appendix A.

The respondents were selected for being knowledgeable about all of the organization's system initiatives. The respondents were divided nearly equally between systems specialists and those in more general management positions.

A key part of INPUT's methodology was that the questionnaire did not specify particular applications or application groups that INPUT had identified or believed were critical. Instead, respondents were encouraged to identify the applications that they believed were important.

After key applications were identified, a further in-depth interview was conducted on 189 of these critical applications concerning plans over a three-

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year period for these applications. A three-year timeframe was selected because, in INPUT's experience, that is the maximum that most organizations are able to plan for.

During May 1996, INPUT edited the questionnaire data and coded open-ended questions into aggregations that could be analyzed both quantitatively and qualitatively. The results were entered into a database for further analysis.

C
Analytic Approach

Respondents were asked to identify the most important applications and their plans for replacement. In the course of its analysis, INPUT put the applications into the following groups:

- Patient-related, including
  - Patient accounting (including admissions)
  - Patient care (including clinical systems)
  - Integrated patient accounting/patient care
- Administrative systems (e.g., purchasing, logistics, HR)
- Ancillary department systems (labs, pharmacy, etc.)
- Medical records (including imaging systems)
- Decision support systems
- Other systems (There were a scattering of small systems, which were not included in further analysis.)

For each application group, INPUT has performed the following analyses:

- *The percent of hospitals planning to replace the application*
- *The reasons for replacing the application*

  In the research conducted for this study, respondents were provided the opportunity to give open-ended reasons for replacing applications. Later in the analysis, these reasons were classified into the following groups:
  - Changing business requirements
  - The need for better information or integration of information

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  - Need for improved connectivity
  - The impact of technological advances
  - Other (primarily the age of the application and the need for improvements in cost or efficiency)

- *The expected size (in dollars) of application replacement projects*

  The costs given are for identified personnel costs (both in-house and external) as well as costs for packaged software, systems integration and/or outsourcing. Although some replacement projects involve additional costs for hardware, these costs were not considered because in many cases they had not yet been identified or it was believed that no substantial hardware costs would be involved.

  Projects have been classified into the following size groups:

  - Under $100K
  - $100 - 500K
  - $500K - $1 million
  - $1 - 5 million
  - Over $5 million (generally under $10 million)

- *Total spending on the application*

  This is INPUT's estimate for total spending in the U.S. for the application. Spending is broken down between 1996, 1997, and 1998 and later.

- *Expected sources for the replacement systems*

D
Organization of This Report

Chapter II, Executive Overview, is a summary of the key findings of this report.

Chapter III, Overall Spending on Critical Hospital Applications, examines key aspects of spending on applications named by hospitals as critical to their operation.

Chapter IV, Analysis of Critical Applications, analyzes each of the critical applications identified during INPUT's research.

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Chapter V, Technology-Related Issues, examines other technology-related issues uncovered during the study.

Appendix A contains the questionnaire used for the survey of hospitals.

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II

Executive Overview

This study examines the plans of U.S. hospitals for replacing critical applications. This chapter summarizes:

- Total expected spending on critical applications
- Replacement rates for critical applications
- The reasons why applications are being replaced
- The expected sources of these applications
- Technical issues being addressed
- The balance between business and technical objectives in applications decision making
- Overall conclusions and recommendations

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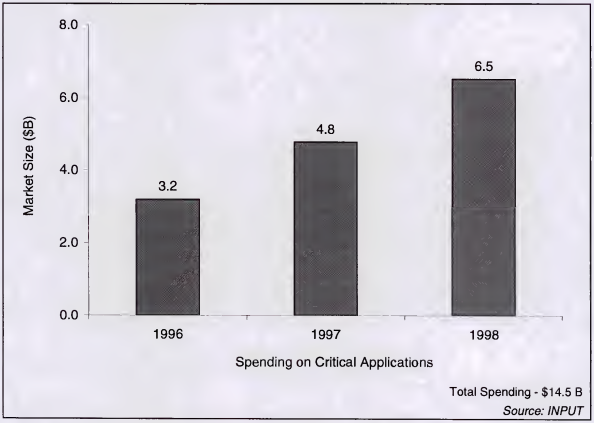
A

Total Spending on Key Applications

Hospitals plan to spend over $14 billion on IT services and software for critical applications over the next three years (Exhibit II-1).

Exhibit II-1

Spending on Critical Applications by Year



INPUT expects that not all of the planned spending will take place as scheduled; on balance, INPUT does not expect more than 10% of this planned spending to lapse or fall into later time periods.

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B
Replacement Rates for Critical Applications

One reason for the high level of spending is that replacement rates for categories of major applications will be very high over the next three years.

The great majority of respondents expect the replacement to occur in the next three years–which is, after all, near the end of most institutions' planning horizons. The replacement rate is a key metric for both hospitals and vendors.

The research classified applications into the following groupings:

- Patient-related, including
  - Patient accounting systems (including admissions)
  - Patient care (including clinical systems)
  - Integrated patient accounting/patient care systems
- Administrative systems (e.g., purchasing, logistics, HR)
- Ancillary department systems (labs, pharmacy, etc.)
- Medical records (including imaging systems)
- Decision support systems

Patient-related applications (taking separate and integrated patient accounting and patient care systems together) will see replacement rates of nearly 90%.

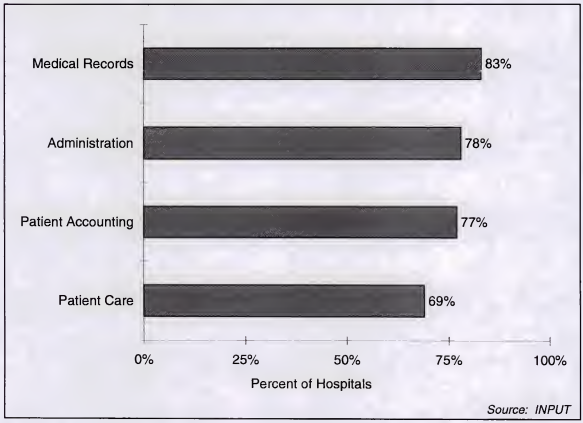
Medical record system replacement is expected to be almost as high.

Decision support applications will have the lowest rate of installation–and these will average almost 60%.

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Exhibit II-2

Major Application Replacement Rates



Source: INPUT

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C
Reasons for Replacement

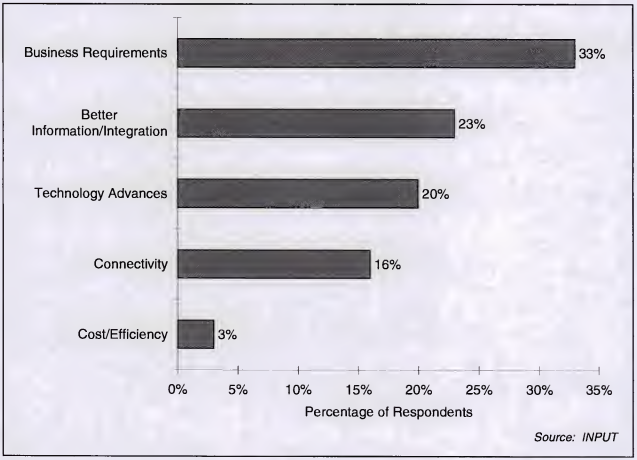
The underlying driver for the high rate of change is, of course, managed care and its impact on the overall health care environment. This is reflected in the reasons hospitals give for making application changes:

- Changing business requirements, especially the pressures of managed care
- The need for better information
- Improved communications

Together, these make up about three-quarters of the reasons given for applications changes (Exhibit II-3).

Exhibit II-3

Reasons for Changing Applications



Source: INPUT

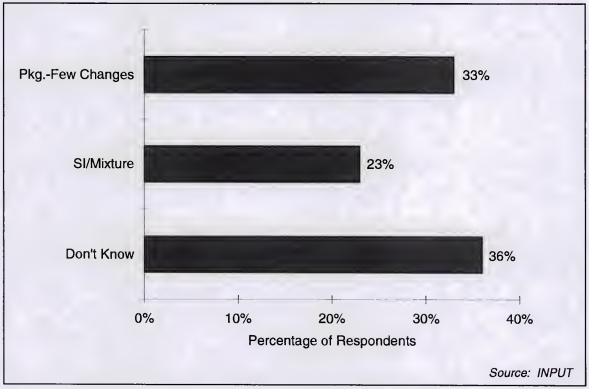
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D
Sources of New Applications

In about two-thirds of applications decision-making situations, the general source for the replacement applications has been identified by the hospital (Exhibit II-4).

Exhibit II-4

Sources of Major Applications



Source: INPUT

The main sources expected to be used are packaged software or some form of vendor assistance. For most applications, solely in-house resources will be undertaken for only a small minority of projects.

Package use can be further subdivided into cases in which many changes are expected to be made in the application and those in which the package will be used with few changes.

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Hospitals expect to make significant use of services vendors (i.e., those supplying professional services and systems integration). The vendor to be used has not yet been identified for most planned applications. In many cases, the exact form the services vendor assistance will take is not yet known. The assistance may take several forms:

- Vendors may provide purely professional services, where the vendor works alongside hospital staff or under the direction of the customer.
- In some cases, it is already expected that vendors will supply a fully integrated solution.
- In other cases it is expected that vendors will supply a mixture of services.
- In many cases, services vendors will build on software packages or modules. In these cases, the services component overlaps the packaged software component.

Few hospitals foresee purely in-house custom system development–the business and technical knowledge base required is just too large.

Outsourcing (including processing services) was rarely identified as a separate category. In INPUT's view, this was because:

- Outsourcing is by nature "aperiodic"–that is, it is often not planned, or even known about, far in advance but arises because of a particular set of circumstances within the customer organization.
- The knowledge of outsourcing plans and decisions, if it exists, is often limited to a small set of usually senior people.

The most interesting category, especially from the vendor standpoint is "Don't Know": This presents an opportunity for every type of vendor, especially outsourcing/processing vendors and systems integrators.

E
Business and Technical Objectives in Applications Decision Making

1. Balance Between Technology and Business Objectives

Business needs are clearly driving the applications replacement process; however, technology issues cannot be ignored. The majority of respondents said that they would give a higher weight to business issues as opposed to technical issues when making application change decisions. Obviously, business objectives will be dependent on using appropriate technology.

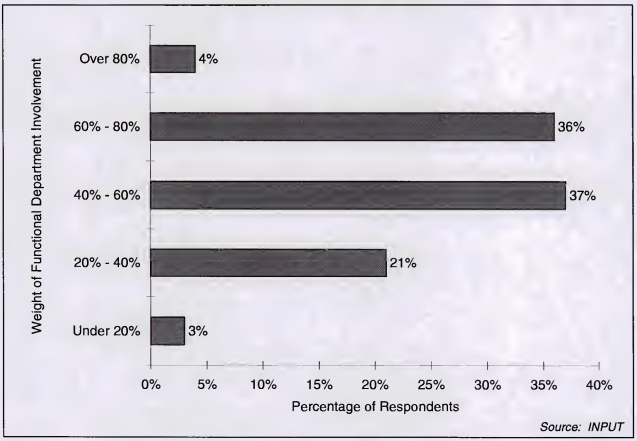
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2. Organizational Location of Decision Making

In a declining number of organizations, the IS group makes the key decisions on new applications.

More common, however, is a sharing of responsibility between the IS department and the functional units involved, as shown in Exhibit II-5. The trend is for the functional units to assume more responsibility.

Exhibit II-5



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F
Technology Issues

1. Operating Environments

The chief difference between the hospital sectors and many other markets is in hospitals' plans to use UNIX as a principal platform for applications.

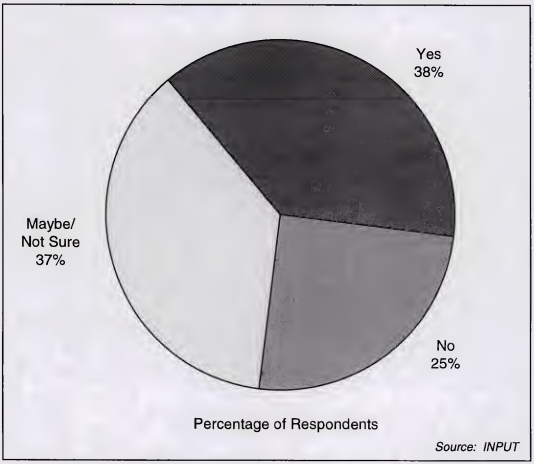
The Microsoft family of operating systems (Windows and NT) is–unusually, in comparison to most other industry sectors–planned as the primary platform by a minority of hospitals. This picture would change somewhat if Microsoft could reverse a high proportion of the "Don't Knows."

2. Object-Oriented Plans

In about a third of future applications, hospitals hope to be able to make use of object-oriented technology (Exhibit II-6).

Exhibit II-6

Planned Use of Object-Oriented Technology



INPUT believes that, as a group, hospitals will wait for the established product vendors to produce object versions of their products.

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3. The Year 2000

On current plans, most hospitals expect to replace most critical applications before the year 2000. If hospitals are able to maintain this rate of replacement, it is unlikely that the hospital sector will be faced with the high level of "Year 2000" problems that are now being predicted for some organizations.

4. Use of the Internet/Intranets

Only 4% of respondents mentioned the use of the Internet in their technical plans. INPUT believes, however, that this situation will change rapidly as hospitals become more knowledgeable about the Internet and, especially, about Intranet issues.

G
Conclusions and Recommendations

Based on the research for this project, as well as other recent work that INPUT has performed, INPUT has drawn the following conclusions and associated recommendations.

- The high level of application replacements will provide many hospitals with opportunities to make improvements to their systems and the underlying business functions.
- Hospitals will look to third-party vendors for the bulk of this assistance.
- Hospital application strategies are still in a period of transition. This means that hospitals are trying to achieve:
  - Improved efficiency
  - Improved general information
  - Support for provider networks
  - Support for negotiations with managed care organizations

  Some applications fill more of these needs than others, as shown in Exhibit II-7.

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Exhibit II-7

Hospital Application Strategies

Application Type	Efficiency	Information	Processing Network	Managed Care Negotiations
Patient-Related	X	X	X	X
Administrative	X			
Ancillary	X	X	X	X
Medical Records		X	X	
Decision Support	X	X		X

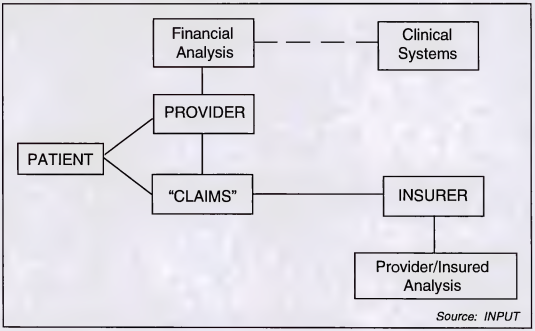
Source: INPUT

- The new applications planned may not, however, not be sufficient to support the needs of many hospitals in the new managed care environment.
  - Many, if not most, of these new applications may end up being improved versions of applications that still assume a pre-managed care operating environment. This is the "processing" model shown in Exhibit II-8.
  - To operate in a managed care environment will require a much higher level of operational *and* analytic integration.
- This new level of integration is what INPUT terms the "megabase" health care environment (Exhibit II-9). We are still at least a year away from many megabase-oriented applications being designed and offered.
- Consequently, it is quite likely that many replacement applications will need to be upgraded or replaced themselves soon after installation.

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Exhibit II-8

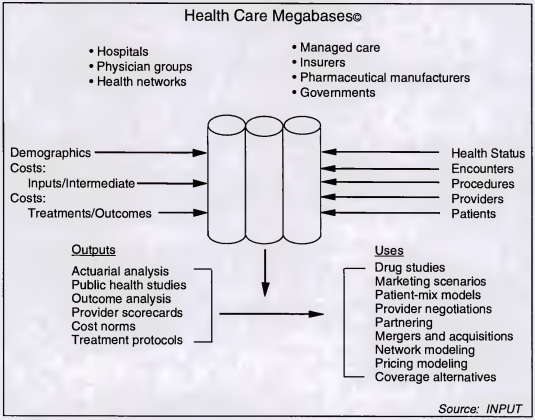
Traditional "Processing" Model



Source: INPUT

Exhibit II-9

Health Care "Megabases"



Source: INPUT

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III

Overall Spending on Critical Hospital Applications

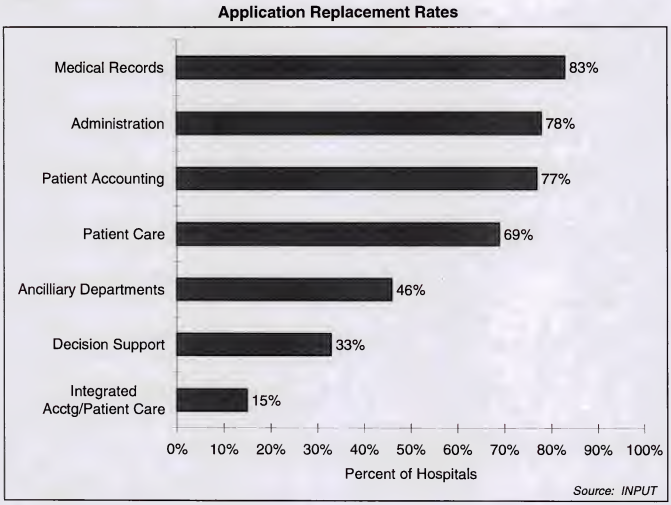
A
Rate of Application Replacement

Application replacement rates are forecast to be quite high over the next three years (Exhibit III-1). Note: The following application groups were not specified by INPUT during the research, but were classified in the course of the analysis of interview data.

- Patient-related, including
  - Patient accounting (including admissions)
  - Patient care (including clinical systems)
  - Integrated patient accounting/patient care systems
- Administrative systems (e.g., purchasing, logistics, HR)
- Ancillary department systems (labs, pharmacy, etc.)
- Medical records (including imaging systems)
- Decision support systems

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Exhibit III-1



These replacement rates include situations where a current application is being replaced and one where the application is essentially new.

- As shown in Exhibit III-2, patient-related and administrative applications are, essentially, seen as improved versions of existing applications.
- Decision support applications, on the other hand, are primarily viewed as applications that will be meeting new needs.

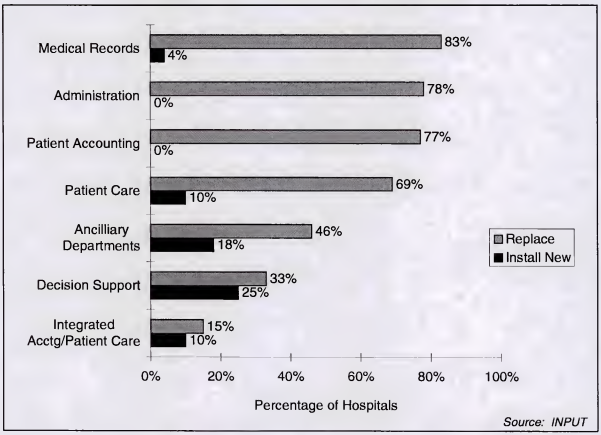
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This dichotomy is a logical one and consistent with the way that hospitals have historically done business. However, INPUT believes that in the future many, if not most, applications across the board will have to be "new" in the sense that they will support new ways of doing business.

The great majority of respondents expect the replacement to take place within the next three years–near the end of most institutions' planning horizons.

Exhibit III-2

Install New versus Replace Existing System



Source: INPUT

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B
Reasons for Application Replacement

The underlying driver for the high rate of change is, of course, managed care and its impact on the overall health care environment. Dealing with managed care puts several mutually reinforcing types of pressure on hospitals.

- Hospitals need to reduce expenses and become more efficient in order to compete against other suppliers.
- New types of communications will be required to support provider networks. Often, the new communications systems will have to handle new types of data as well.
- Hospitals will in the longer term need to make significant improvements to their management information. Methods of analyzing this information will also have to be changed in order to better negotiate with managed care organizations.

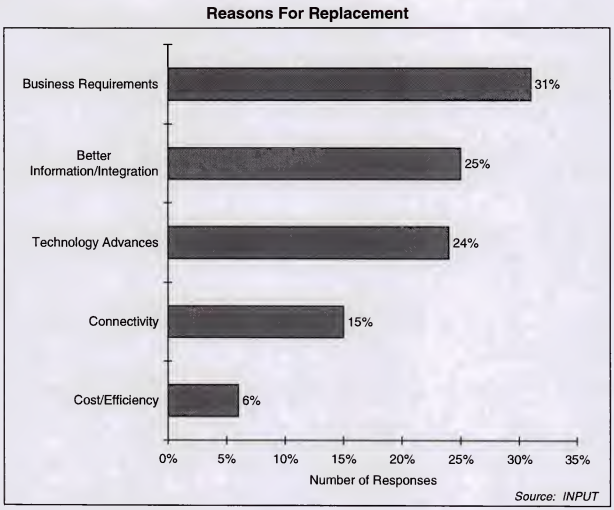
These pressures are reflected in the reasons given for making application changes:

- Changing business requirements, especially the pressures of managed care
- The need for better information
- Improved communications

Together, these reasons make up about three-quarters of the reasons given for applications changes (Exhibit III-3).

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Exhibit III-3



This is a significant difference from the situation earlier in the 1990s, when changes were more often driven by desires to:

- Keep up with technology
- Make general improvements in efficiency
- Respond to lists of improvements generated by users

In the past, the sheer age of an application was often cited as a reason for replacement. This was hardly ever the case in this study.

In summary, "business obsolescence" is now the critical component of change, as opposed to the "technical obsolescence" of the past.

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C
Hospital Spending

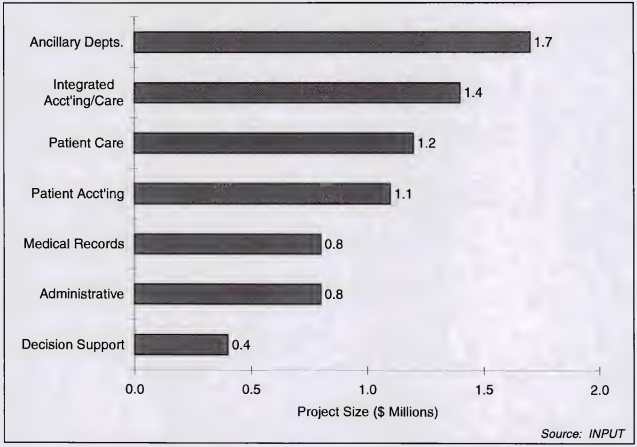
Exhibit III-4 shows the median size of projected spending on replacement applications, by application type. These are services and software expenses only and exclude hardware-associated expenses.

- The following expenses are included:
  - Software development (whether internal or external)
  - Packaged software (including modifications)
  - Systems integration
  - Training and education
  - Outsourcing (but see section D below for further discussion)
- Hardware expenses are excluded for the following reasons:
  - It was not always known if a replacement application would involve new hardware.
  - The hardware costs were often not known.
  - Hardware requirements are often analyzed across multiple applications.
  - In some cases, it was assumed that there would be little or no additional hardware expense.

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Exhibit III-4

Expected Size of Projects (Excluding Hardware)



Source: INPUT

Hospitals plan to spend over $14 billion on IT services and software for critical applications over the next three years (Exhibit III-5).

Not all of this spending will necessarily take place as planned:

- There will be inevitable slippage.
- Given the financial pressures on increasing numbers of hospitals, there may not be the resources.
- Some hospitals will go out of business or merge.

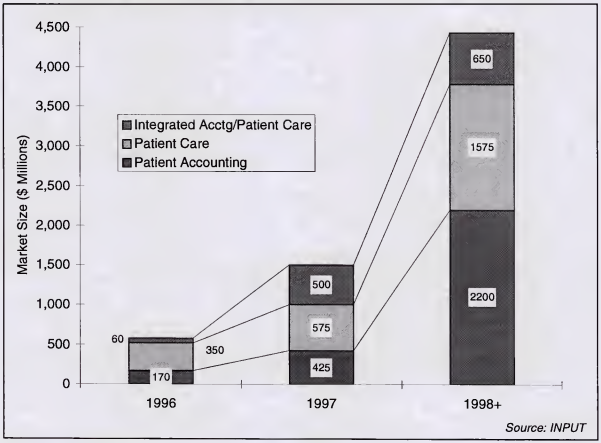
On the other hand, hospitals will make additional application commitments not presently planned.

Taking all these factors into account, INPUT does not expect more than 10% of this planned spending to lapse or fall into later time periods.

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Exhibit III-5

Spending on Patient Care and Accounting Applications by Year

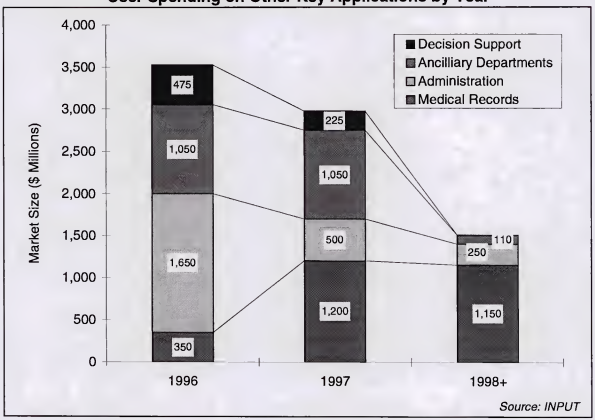


Source: INPUT

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Exhibit III-6

User Spending on Other Key Applications by Year



Source: INPUT

The dramatic difference between these charts (Exhibits III-5 and III-6) indicates the switch in expenditure patterns, over the next three years, towards patient care and accounting applications.

D
Sources of Applications

In about two-thirds of applications decision-making situations, the general source for the replacement applications has been identified by the hospital (Exhibit III-7).

- Vendors are expected to be the source of the application in the vast majority of these situations. Few specific vendors have yet been selected, however.

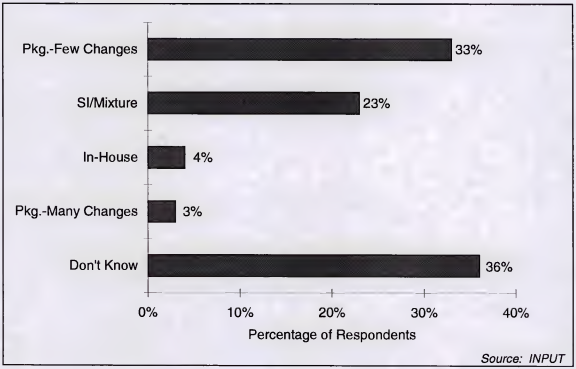
- For many hospitals there is no distinct line between "packaged" solutions and "customized" solutions. Many hospitals expect to have considerable changes made to any packaged software that they purchase.

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- Hospitals also expect there to be many "flavors" of systems integration, including:
  - Total turnkey customized solutions
  - Systems integration around core modules
  - Vendor personnel managing the project, with participation by customer staff
  - The hospital staff managing the project, with vendor staff supplying key skills and capabilities
- Few hospitals foresee purely in-house custom system development–the business and technical knowledge base required is just too large.

Exhibit III-7

Sources of Major Applications



Source: INPUT

The main sources expected to be used are packaged software or some form of vendor assistance. For most applications, solely in-house resources will be undertaken for only a small minority of projects. *Source: INPUT*

Package use can be further subdivided into cases in which many changes are expected to be made in the application and those in which the package will be used with few changes.

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Hospitals expect to make significant use of services vendors (i.e., those supplying professional services and systems integration). The exact vendor has not yet been identified for most planned applications. In many cases, the exact form the services vendor assistance will take is not yet known. The assistance may take several forms:

- Vendors may provide purely professional services, where the vendor works alongside hospital staff or under the direction of the customer.
- In some cases, it is already expected that vendors will supply a fully integrated solution.
- In other cases it is expected that vendors will supply a mixture of services.
- In many cases, services vendors will build on software packages or modules. In these cases, the services component overlaps the packaged software component.

Almost all of the firm plans for spending involved using vendors (Exhibit III-8).

- Spending on packaged software accounts for almost half of the planned spending.
- However, as noted earlier, packages where many changes are planned overlap systems integration.

Outsourcing as a separate item could not be reported because:

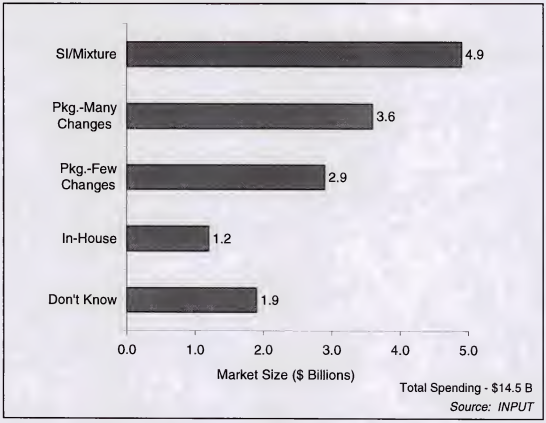
- Even where identified as a likely source, dollar amounts were usually not yet known.
- Outsourcing is by nature "aperiodic"–that is, it is often not planned or even known about far in advance but arises because of a particular set of circumstances within the customer organization.
- The knowledge of outsourcing plans and decisions, when it exists, is often limited to a small set of people and is not widely publicized.

The amount of spending in the "don't know" category will probably end up being smaller as the "don't knows" are converted into an identified source. This will act to raise spending levels generally.

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Exhibit III-8

Total Spending by Source



Total Spending - $14.5 B

Source: INPUT

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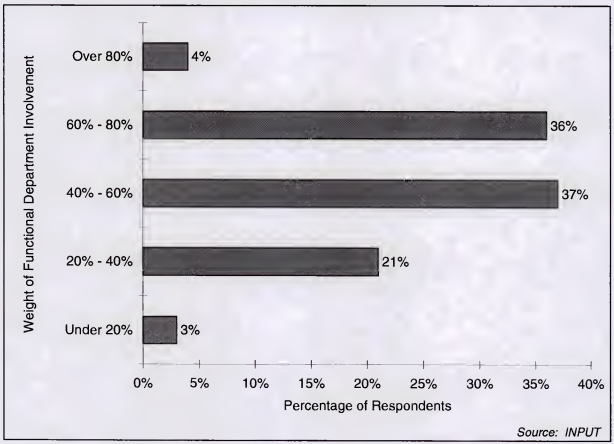
E
Applications Decision Making

In a declining number of organizations, the IS group makes the key decisions on new applications.

More common, however, is a sharing of responsibility between the IS department and the functional units involved, as shown in Exhibit III-9. The trend is for the functional units to assume more responsibility.

Exhibit III-9

Extent of Functional Area Involvement in Decision Making



Source: INPUT

In hospitals, as in many other business sectors, functional users have been playing increasingly important roles in application planning and implementation in general as well as in the replacement process specifically. Part of the reason is the increasing importance of business needs (as described above) relative to purely technological considerations.

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Another organizational factor brought out in INPUT's ongoing research is that users are likely to have ultimate control over budgets for new applications.

This does not mean that users entirely control the definition and selection process. As shown in Exhibit III-8, the balance of responsibilities is usually not 100% on either side, but a mixture of responsibilities. It is quite common for a selection committee or task force to be made up of representative from several areas of a hospital.

INPUT believes that the importance of functional users in the selection process will continue to increase.

- This has been the trend for over five years.
- INPUT expects that this trend may even accelerate as managed care pressures require systems to meet rapidly changing business objectives.

Obviously, vendors seeking to work with a hospital client or prospect must understand where an individual hospital lies on this spectrum.

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IV

Analysis of Critical Applications

This chapter will analyze each of the critical applications identified during INPUT's research. Each of the applications will be reported on in a similar fashion. Section A describes the process used generally. INPUT will make comments on each application where the data does not speak for itself, or where there are marked differences.

A
Analytic Overview

As described in Chapter I, INPUT's research did not specify particular applications or application groups. Instead, respondents were asked to identify their most important applications and their plans for replacement. In the course of the analysis, INPUT grouped the applications named into the following groups:

- Patient-related, including
  - Patient accounting (including admissions)
  - Patient care (including clinical systems)
  - Integrated patient accounting/patient care
- Administrative systems (e.g., purchasing, logistics, HR)
- Ancillary department systems (labs, pharmacy, etc.)
- Medical records (including imaging systems)
- Decision support systems
- Other systems (There were a scattering of small systems, which were not included in further analysis.)

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For each application group, INPUT has performed the following sets of analyses:

- *The percent of hospitals planning to replace the application*
- *The reasons for replacing the application*

  In the research conducted for this study, respondents were provided the opportunity to give open-ended reasons for replacing applications. Later in the analysis, these reasons were classified into the following groups:

  - Changing business requirements
  - The need for better information or integration of information
  - Need for improved connectivity
  - The impact of technological advances
  - Other (primarily the age of the application and the need for improvements in cost or efficiency)

- *The expected size (in dollars) of application replacement projects*

  The costs given are for identified personnel costs (both in-house and external) as well as costs for packaged software, systems integration and/or outsourcing. Although some replacement projects involve additional costs for hardware, these costs were excluded because they may not yet have been identified or it was believed that no substantial hardware costs would be involved.

- *Total spending on the application*

  This is INPUT's estimate for total spending in the U.S. for the application. Spending is broken down between 1996, 1997, and 1998 and later.

- *Expected sources for the replacement systems*

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B
Patient-Oriented Applications

This section assesses, as a group:

- Patient accounting (including admissions)
- Patient care (including clinical systems)
- Integrated patient accounting/patient care

The components of patient-oriented applications are responding in different ways to the challenges of the new health care environment.

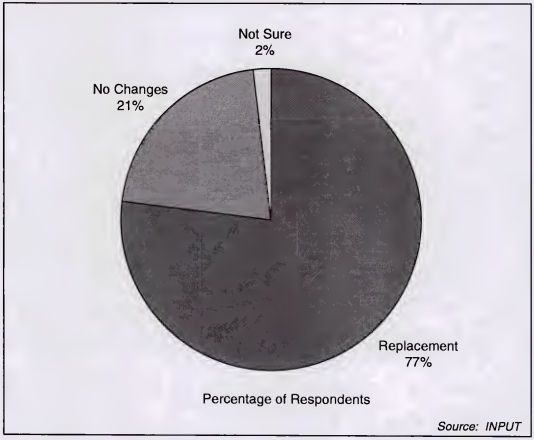
- Patient accounting systems are being driven by the need to respond directly to the new business environments in managed care.
- Patient care systems need to support higher levels of connectivity.
- Many hospitals, especially for patient accounting applications, are uncertain whether SI or packaged software represents the best solution.

INPUT also believes that a considerable number of the standalone patient accounting and patient care applications will ultimately be combined into an integrated application.

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Exhibit IV-1

Hospital Plans for Replacement/Installation of Patient Accounting Systems



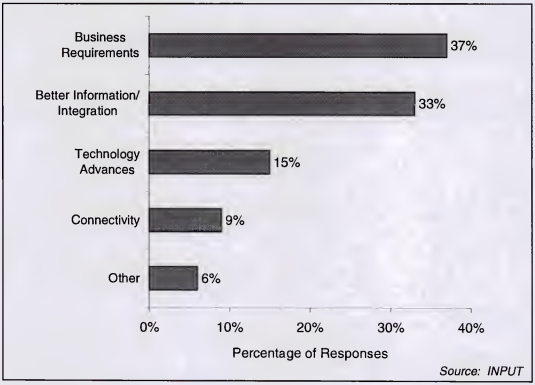
Source: INPUT

- Patient Accounting is one of the principle areas of application change with hospitals
- All the hospitals making a change to Patient Accounting systems indicated that they already have an application for this area and that they are going to make substantial changes to the application or that they are going to replace the application

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Exhibit IV-2

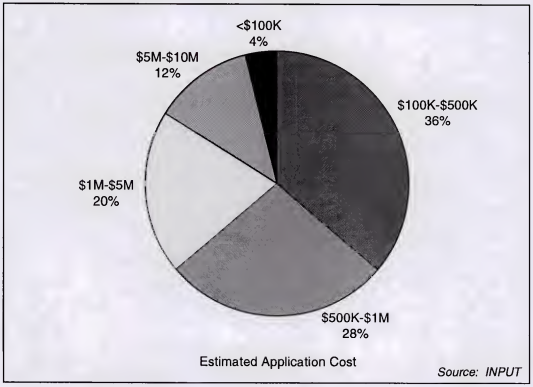
Reasons for Changing Patient Accounting Systems



Source: INPUT

Exhibit IV-3

Expected Size of Projects: Patient Accounting Systems

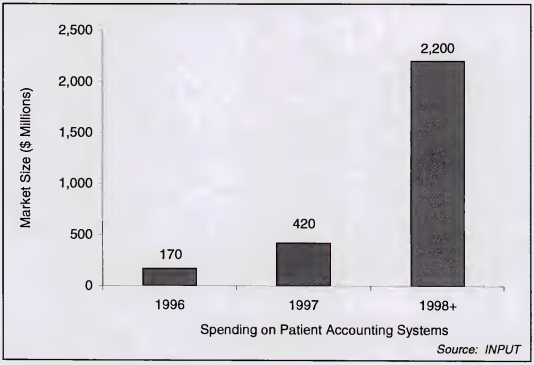


Source: INPUT

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Exhibit IV-4

Spending on Patient Accounting Systems by Year

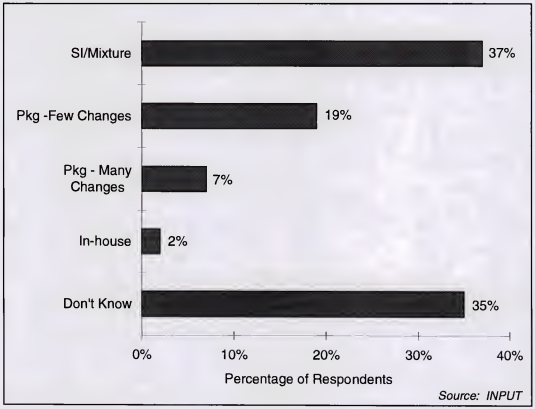


- This is the area of highest planned expenditure after 1997 yet one of the lowest planned expenditures for 1996
- Expenditure plans for beyond 1997 exceed all other areas and are at least twice as high as most other applications
- The timing of the planned expenditure plus the high percentage (77%) of respondents who said they will change their Patient Accounting system indicates a willingness for them to discuss this area with potential vendors. 35% of the respondents have not yet identified the source of the replacement applications
- Sales and marketing efforts should consider addressing this area as soon as possible.

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Exhibit IV-5

Sources of Patient Accounting Systems

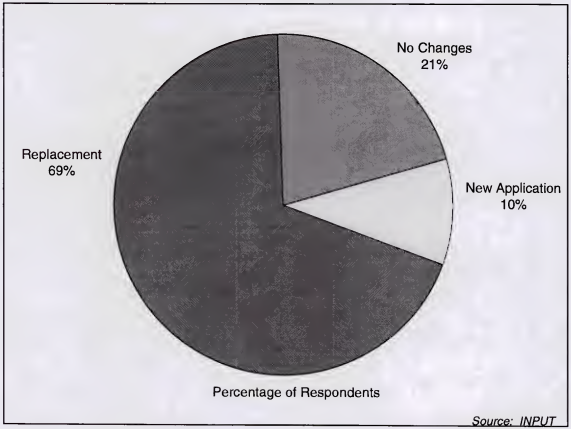


Source: INPUT

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Exhibit IV-6

Percent of Hospitals Planning to Replace/Install Patient Care Systems



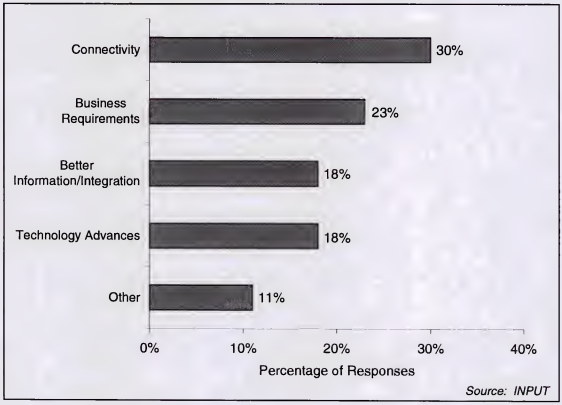
Source: INPUT

- As with Patient Accounting systems, the portion of users who plan to either replace their existing systems or introduce a system for the first time, is high (almost 80%)

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Exhibit IV-7

Reasons for Changing Patient Care Systems

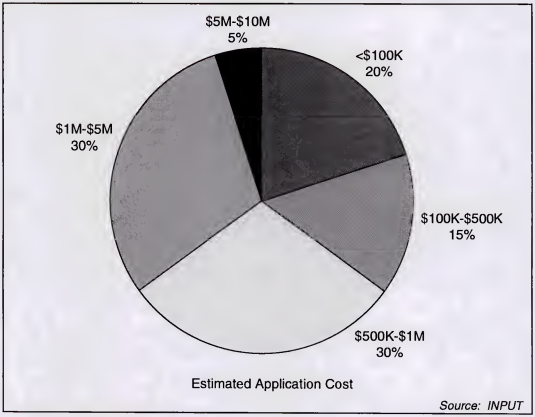


- The percentage of users (30%) who identified improved connectivity as a key reason for change is higher for Patient Care systems than for any other application type
- Sales and marketing actions should emphasize networking and related topics due to the user focus on connectivity

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Exhibit IV-8

Expected Size of Projects: Patient Care Systems



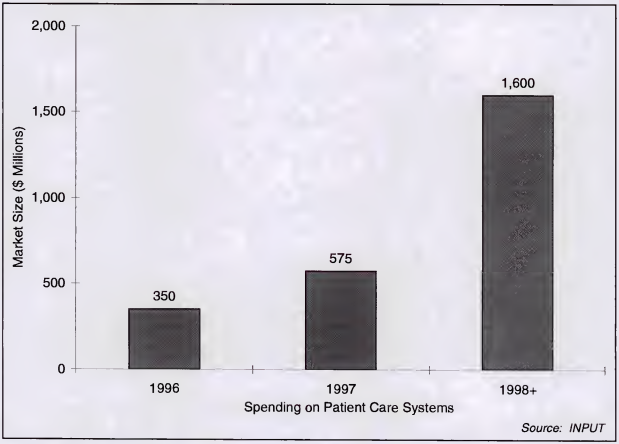
Source: INPUT

- The wide spread of expectations regarding the cost of this application area indicates the range of solutions that will be implemented.

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Exhibit IV-9

Spending on Patient Care Systems by Year

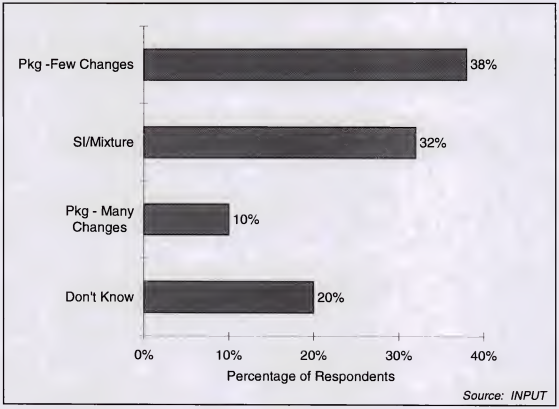


- The bulk of expenditure on Patient Care systems will take place after 1997—as with Patient Accounting systems
- 80% of users have already decided on the source of the new and replacement applications
- Half of the users will buy and modify a software package. This will potentially constrain or exclude vendors who have minimal experience with the packages or who prefer to develop applications from the start.

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Exhibit IV-10

Sources of Patient Care Systems

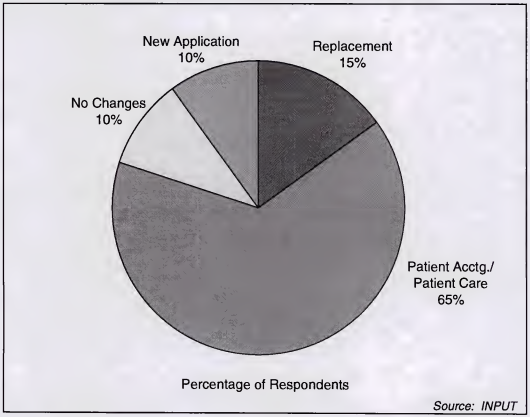


Source: INPUT

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Exhibit IV-11

Percent of Hospitals Planning to Replace/Install Integrated Accounting/Patient Care Systems



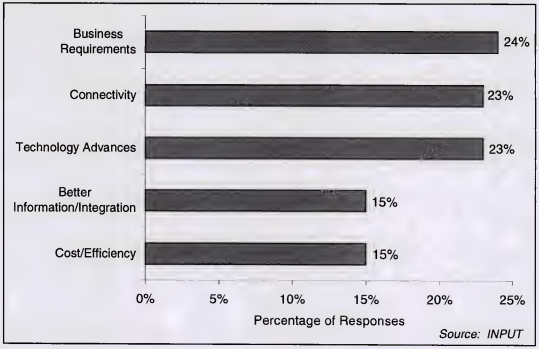
Source: INPUT

- The 65% of respondents shown for the Patient Accounting/Patient Care group is the portion of all respondents who currently have a non-integrated system and intend to move to an integrated environment
- This chart highlights the opportunity for vendors of non-integrated systems who have the potential to upgrade their clients to integrated systems—they should be discussing this upgrade without delay
- Vendors of integrated systems should ensure they have migration plans and services in place to help hospitals move to the new applications

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Exhibit IV-12

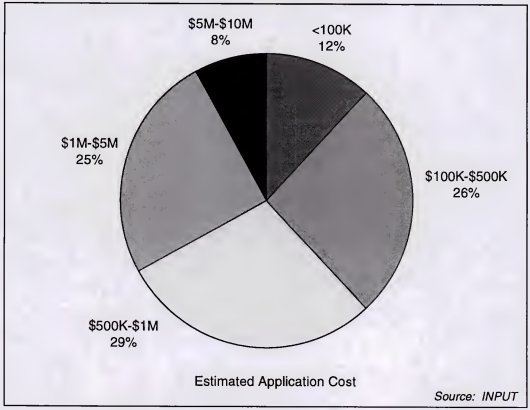
Reasons for Changing Integrated Accounting/Patient Care Systems



Source: INPUT

Exhibit IV-13

Expected Size of Projects: Integrated Accounting/Patient Care Systems

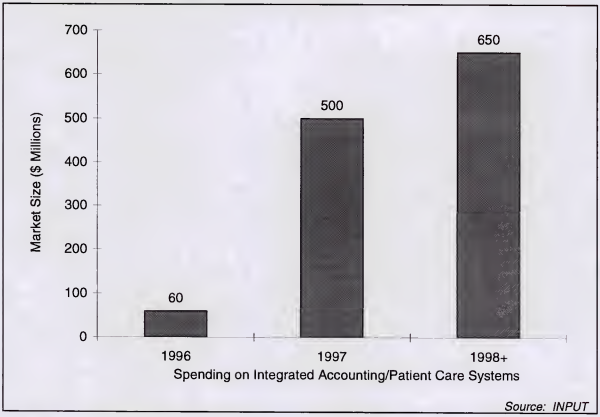


Source: INPUT

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Exhibit IV-14

Spending on Integrated Accounting/Patient Care Systems by Year

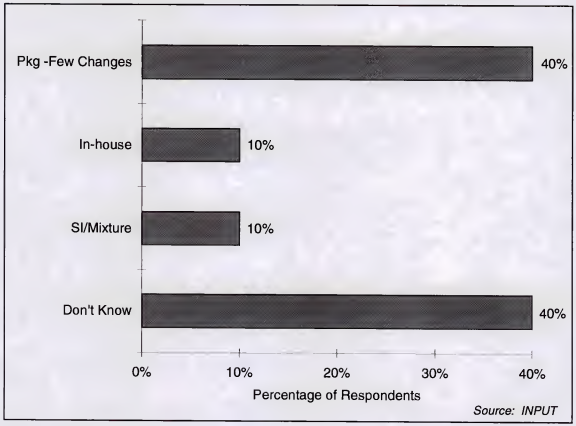


Source: INPUT

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Exhibit IV-15

Sources of Integrated Accounting/Patient Care Systems



- The introduction of integrated accounting/patient care systems has a far higher portion of hospitals using internal resources than either accounting or patient care as stand-alone systems — 10% compared with 2% and 0% respectively
- This indicates that some hospitals are going to integrate existing systems in-house instead of developing or buying a system that was originally developed for an integrated environment.

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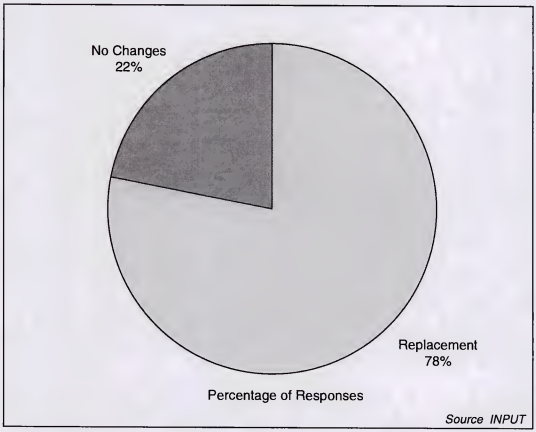
C
Administrative Systems

Administrative systems are more likely to be replaced for technological reasons, often to keep them compatible with other applications being replaced.

Many hospitals want to replace these applications quickly. Replacement may not be as fast as planned, given the large number of "Don't Knows" concerning the source of replacement applications.

Exhibit IV-16

Percent of Hospitals Planning to Replace/Install Administrative Systems

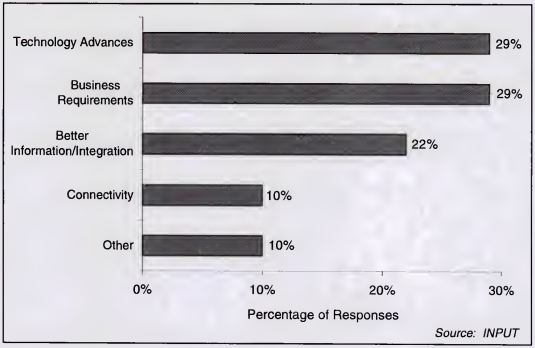


Source INPUT

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Exhibit IV-17

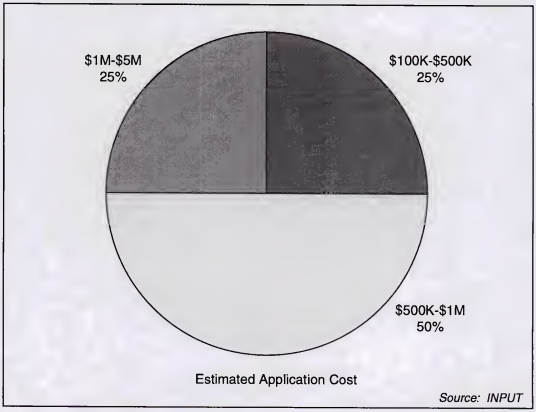
Reasons for Changing Administrative Systems



Source: INPUT

Exhibit IV-18

Expected Size of Projects: Administrative Systems

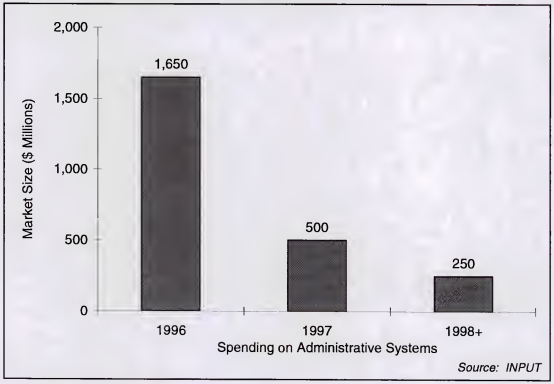


Source: INPUT

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Exhibit IV-19

Spending on Administrative Systems by Year



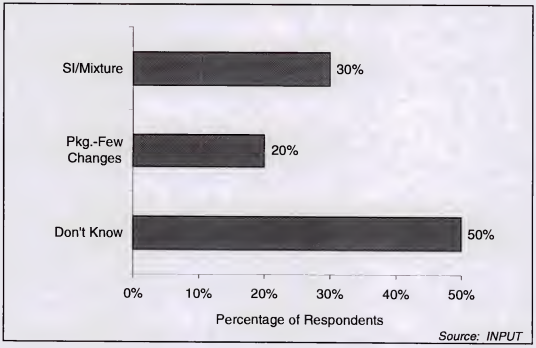
Source: INPUT

- According to the respondents, this is the main area of expenditure in 1996. Over 40% of planned 1996 expenditure on new and replacement systems will be in the area of Administrative Systems. By 1998, Administrative Systems account for only 4% of total expenditure.

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Exhibit IV-20

Sources of Administrative Systems



Source: INPUT

In the short term, Administrative Systems should be a primary target for sales and marketing activity since:

- There is high planned expenditure in 1996/1997—$2.2B
- 50% of the respondents that they are unsure of the source of the new or enhanced applications
- Of those respondents who do have a plan for sourcing the applications, they will do not intend to use internal resources for development and implementation.

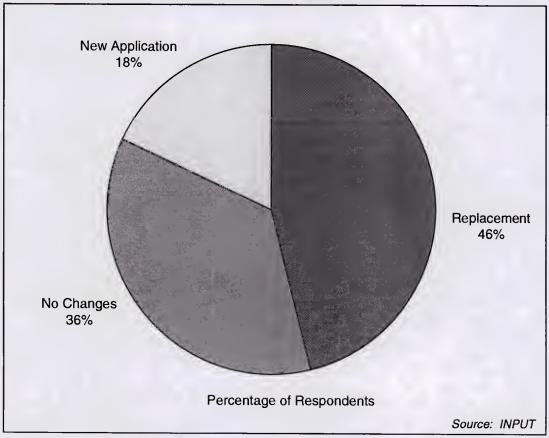
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D
Ancillary Departments

Replacement rates for ancillary department applications are somewhat lower than for other applications. In large part this reflects their specialized needs as well as the fact that these applications are somewhat sheltered from the immediate impact of managed care. However, the primary reasons for change are those that are driving replacement generally: better information and changed business requirements.

Exhibit IV-21

Percent of Hospitals Planning to Replace/Install Ancillary Department Systems

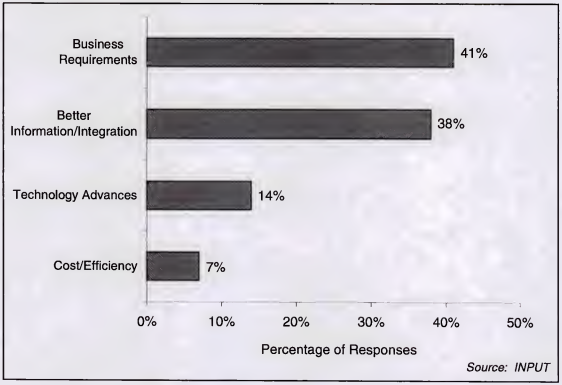


Source: INPUT

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Exhibit IV-22

Reasons for Changing Ancillary Department Systems

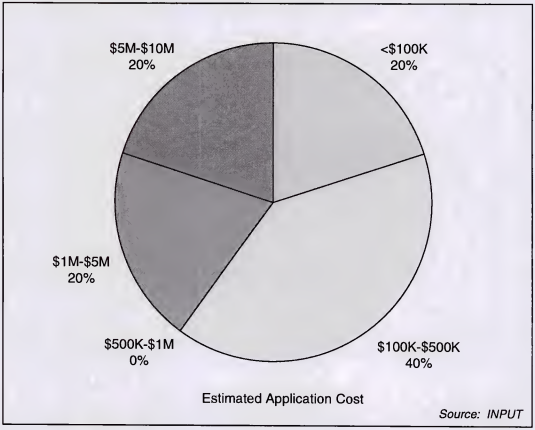


Source: INPUT

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Exhibit IV-23

Expected Size of Projects: Ancillary Department Systems



Source: INPUT

- While the application area with the highest planned expenditure during 1996 and 1997 is Administration ($2.2B), Ancillary Systems is almost as high with $2.1B
- Planned expenditure on Administration and Ancillary systems reduces rapidly in 1998.
- Based on expenditure plans, Administration and Ancillary Systems are the highest priority areas for hospitals in the next 2 years.

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Exhibit IV-24

Spending on Ancillary Department Systems by Year

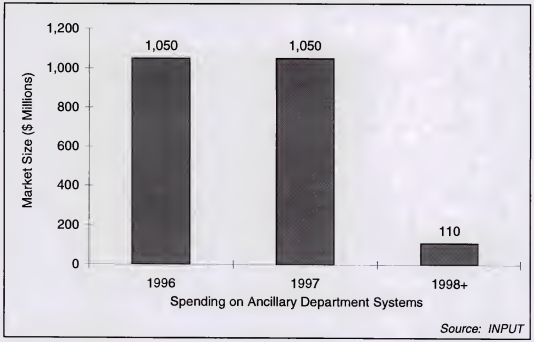
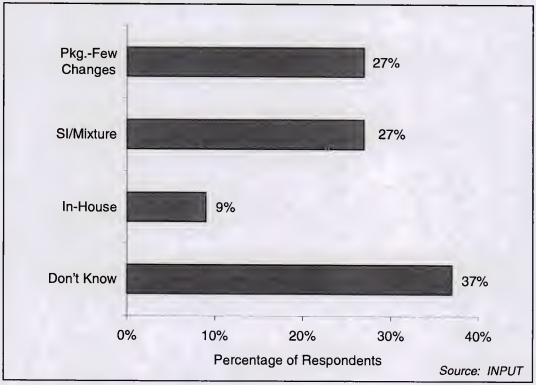


Exhibit IV-25

Sources of Ancillary Department Systems



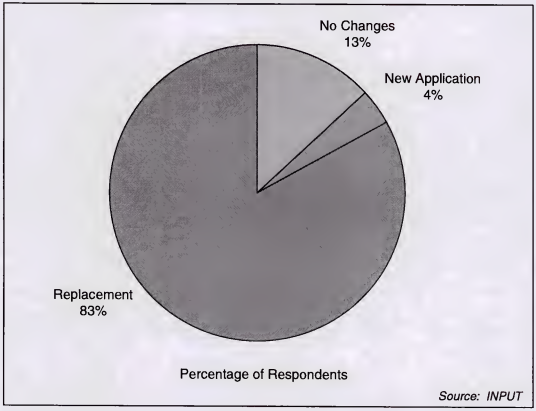
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E
Medical Records

Given the high rate of replacement among patient-oriented applications, it is not surprising to see similar patterns to the change in medical record systems.

Exhibit IV-26

Percent of Hospitals Planning to Replace/Install Medical Record Systems

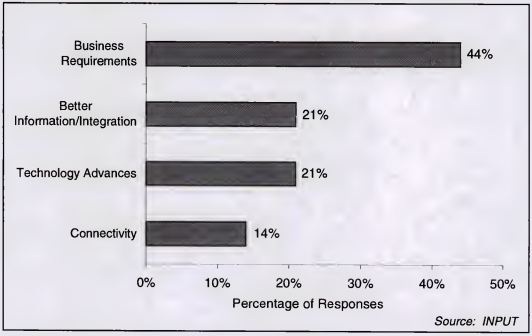


- Greater change is expected in this area compared with any other application type. 87% of respondents plan to significantly change existing Medical Record systems or implement new systems

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Exhibit IV-27

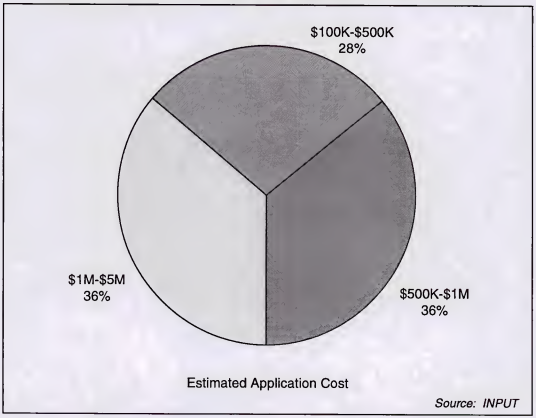
Reasons for Changing Medical Record Systems



Source: INPUT

Exhibit IV-28

Expected Size of Projects: Medical Record Systems

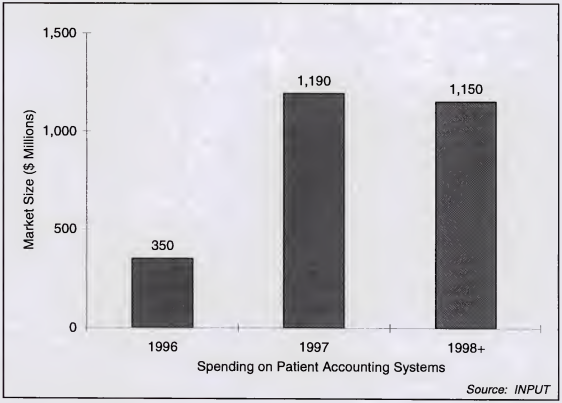


Source: INPUT

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Exhibit IV-29

Spending on Medical Record Systems by Year

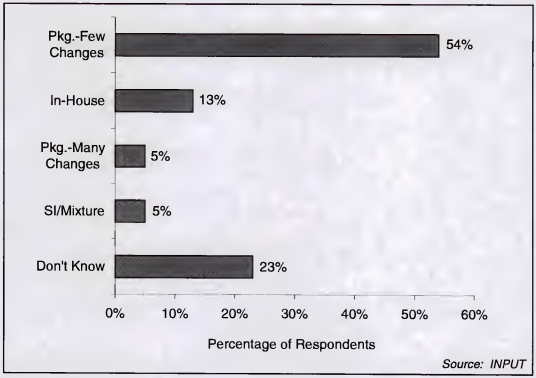


Source: INPUT

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Exhibit IV-30

Sources of Medical Record Systems



- The percentage of users planning to make only a few changes to a software package is higher than for any other application area even though there was a wide spread of choices for the source of the Medical Record systems
- The Medical Records market does not appear to be a good market for systems integration companies unless they can also provide a software package
- The rate of usage of systems integrators (5%) is less than half of the rate for other application

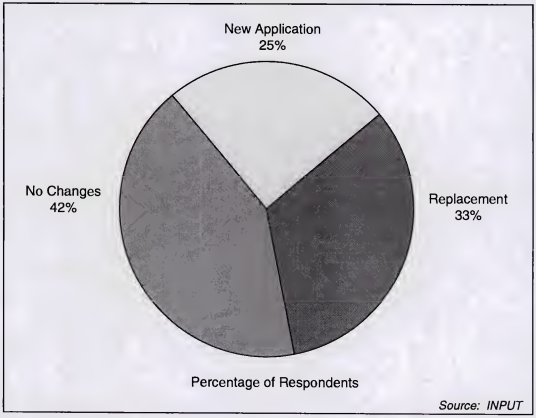
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F
Decision Support

This application area is one where totally new applications are quite common. This reflects the need for more information and analysis in a managed care environment. Advances in client/server technology and data warehousing are among the reasons making decision support more feasible. Initial project costs will generally be lower than those for broader-based applications, such as those in patient care or many administrative applications.

Exhibit IV-31

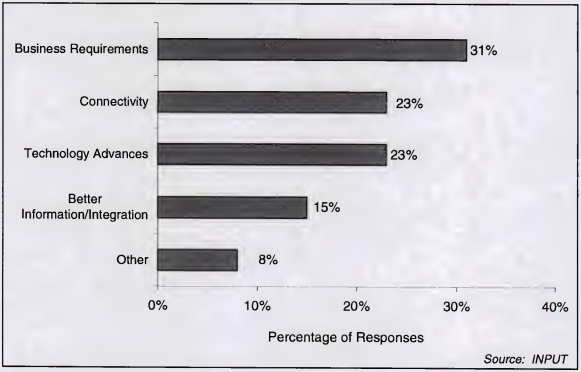
Percent of Hospitals Planning to Replace/Install Decision Support Systems



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Exhibit IV-32

Reasons for Changing Decision Support Systems

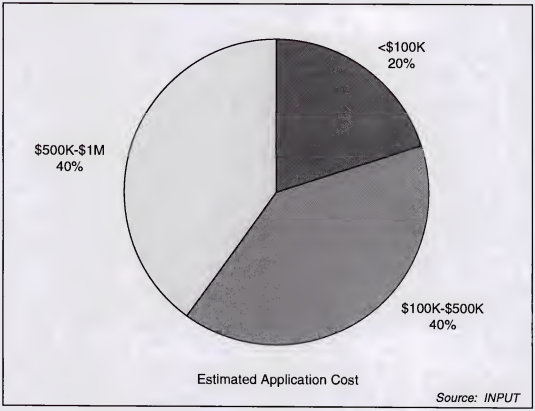


Source: INPUT

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Exhibit IV-33

Expected Size of Projects: Decision Support Systems



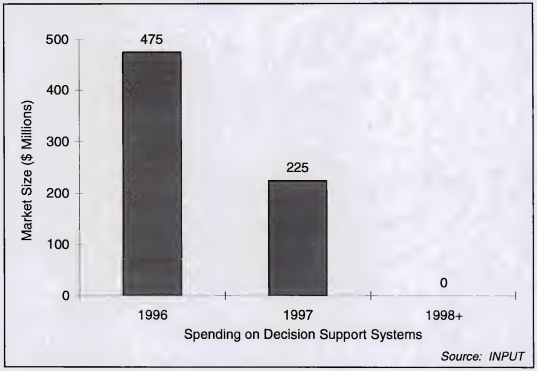
Source: INPUT

- Decision Support systems is the area of least planned expenditure of the application systems studied in this project ($0.7B)
- This area presents an immediate opportunity for vendors as all expenditure in this area is planned for 1996/1997

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Exhibit IV-34

Spending on Decision Support Systems by Year

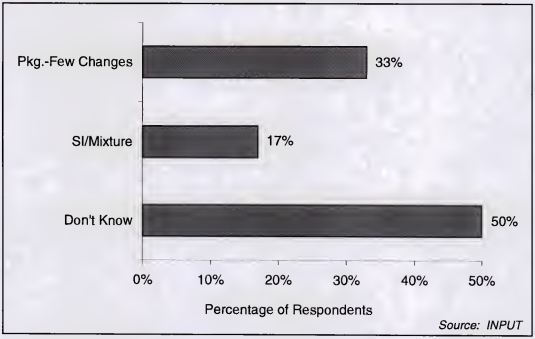


Source: INPUT

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Exhibit IV-35

Sources of Decision Support Systems



Source: INPUT

- The high incidence (50%) of users who have not decided on the source of the new decision support applications identifies this area as having good potential for sales
- However, this should be tempered with the awareness that Decision Support has the lowest planned expenditure of all the application areas
- Lack of knowledge regarding the potential of new decision support tools may be delaying plans for change of these applications

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V

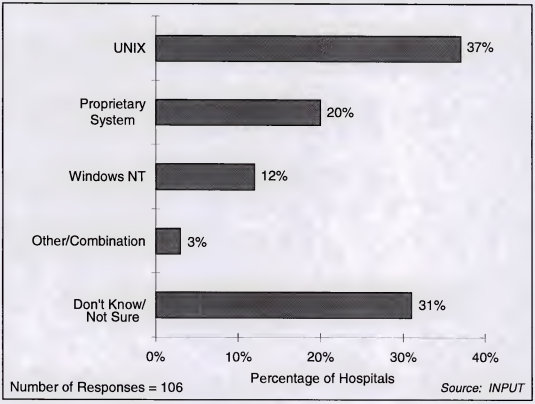
Technology-Related Issues

A
Operating Environments

The chief difference between the hospital sectors and many other markets is in hospitals' plans to use UNIX as a principal platform for applications (Exhibit V-1).

Exhibit V-1

Planned Platforms for New/Replacement Applications



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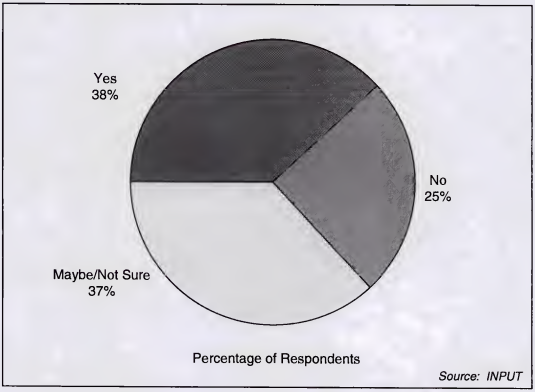
The Microsoft family of operating systems (Windows and NT) is–unusually, in comparison to most other industry sectors–planned as the primary platform by a minority of hospitals. This picture would change somewhat if Microsoft can change a high proportion of the "Don't Knows."

B
Object-Oriented Technology

In about a third of future applications, hospitals hope to be able to make use of object-oriented technology (Exhibit V-2).

Exhibit V-2

Planned Use of Object Oriented Technology



Source: INPUT

This openness to object-oriented technology appears to reflect:

- The heritage of the "MUMPS" language
- Hospitals being one of the focuses of Andersen's Project Eagle
- The focus of firms like Visteon for creating business objects for the health care environment

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Intranet "applets" would be another use of object technology. However, the research for this study did not uncover plans or much awareness of this issue. INPUT does believe that the needs of managed care could give the hospital sector compelling business reasons to make use of intranet technology.

INPUT believes that, as a group, hospitals will wait for the established product vendors to produce object versions of their products.

C
The Year 2000

On current plans, most hospitals expect to replace most critical applications before the year 2000. If hospitals are able to maintain this planned replacement rate, it is unlikely that the hospital sector will be faced with the high level of "Year 2000" problems that are now being predicted for some organizations.

However, it is important for vendors to demonstrate the ability of their systems to cater for dates beyond 1999 during sales negotiation.

D
The Internet/Intranets

Only 4% of respondents mentioned the use of the Internet in their technical plans. INPUT believes, however, that this situation will change rapidly as hospitals become more knowledgeable about the Internet and, especially, about Intranet issues.

E
Balancing Technology and Business Application Decision Making

Business needs are clearly driving the applications replacement process; however, technology issues cannot be ignored. The majority of respondents said that they would give a weight of between 60% and 80% to business issues as opposed to technical issues when making application change decisions (Exhibit V-3). Obviously, business objectives will be dependent on using appropriate technology. The exact balance will depend on many factors, including:

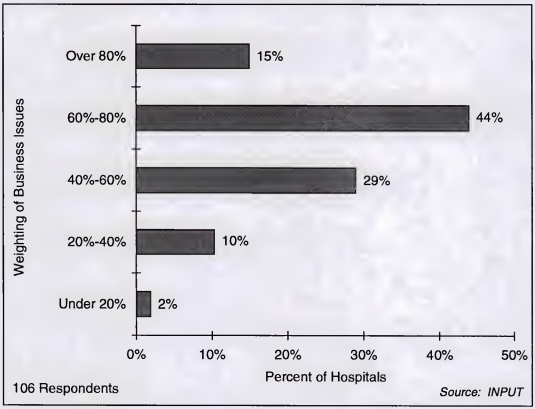
- The extent to which new business objectives are different from prior business objectives
- The extent to which there will be integration of user functions (which will then require a higher level of technical integration)

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- The current level of technology; the success of new technology in the past; the organization's willingness to take technology risks
- The amount of business risk facing a hospital
- The level of mutual confidence among the functional units and between the functional units and the IS department(s)

Exhibit V-3

Business Area Decision Making



106 Respondents

Source: INPUT

F

Data Warehousing and Megabases

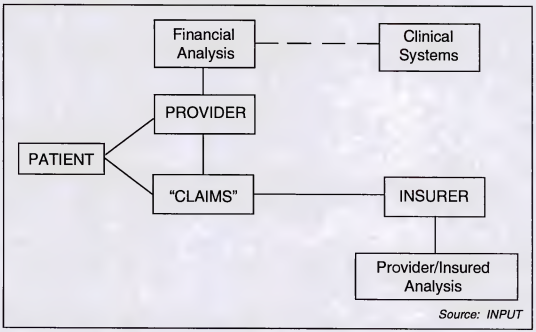
Some of the respondents to the study referred to the need for data warehousing to support decision support systems. Data warehouses can be an important component of an information strategy for hospitals competing in the managed care environment.

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- Many of the other new applications planned may not, however, not be sufficient to support the needs of many hospitals in the new managed care environment.
  - Many, if not most, of these new applications may end up as improved versions of applications that still assume a pre-managed care operating environment. This is the "processing" model shown in Exhibit V-5.
  - To operate in a managed care environment will require a much higher level of operational and analytic integration.
- This new level of integration is what INPUT terms the "megabase" health care environment (Exhibit V-5). We are still at least a year away from many megabase-oriented applications being designed and offered.
- Consequently, it is quite likely that many replacement applications will need to be upgraded or replaced themselves soon after installation.

Exhibit V-4

Traditional "Processing" Model

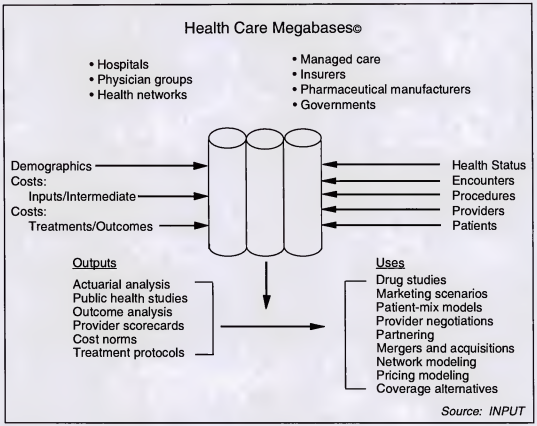


Source: INPUT

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Exhibit V-5

Health Care "Megabases"



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Questionnaire

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MAJOR CRITICAL APPLICATIONS STUDY

My name is _____. I'm with INPUT, a research and consulting firm in Teaneck, New Jersey. We are conducting a study on why and on what cycle companies replace their major applications. All the information you provide will be kept confidential, as well as your name and your company's name. In return for your assistance, we will send you a summary of the completed study at no charge.

1a. First of all, what are your five most important applications today? (in order of importance)

1b. How will this list change in five years, either in terms of their order on the list, or by the adding of new applications?

1996	2001
1._____	_____
2._____	_____
3._____	_____
4._____	_____
5._____	_____

1c. What are the reasons for these changes?

2. Next, I would like to understand more about four of these applications. (Select the top four in 2001.)

   Use one of the attached "Applications, Questions Attachment" for each application.

3. Now I would like to ask a few more general questions.

   A. What would you say is the relative weight of the decision-making authority between IS and users when replacing or changing applications software?

      IS ___%

      Users ___%

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B. What do you see as the relative weight of technology requirements versus business needs when replacing or changing applications software?

Technology ___%

Business ___%

4. What would you say are the major trends or issues in the IT marketplace today and over the next few years?

5. Do you have any other comments on the trends of major applications, either in your organization or generally?

A. What is the source of this application?

In-house developed _____

Custom developed _____

A commercial software package_____

(Name - _____)

Other (e.g., combination of above, developed by parent company)

B. What year was it installed?

C. Approximately how much were the implementation costs?

Under $100,000_____ $1M - $5M _____

$100K - $500K _____ $5M- $10M_____

$500 - $1M _____ Over $10M_____

Does this amount include/exclude hardware? If included, about what percent was for hardware?__%

D. How well were initial expectations for this application met? (Use a scale of 1 to 5, with 5 being highest) ____Why? How would you rate the performance of the application now? ____ Why?

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E. Do you expect to replace or make major modifications to this application in the next five years?

No (end questionnaire)

Yes

- Will this be a replacement _or a major modification____?
- When do you expect or want to make this change?

F. Why are you making the change?

G. What type of hardware, software and communications environments do you expect to use?

- Hardware environment[s] (e.g., Intel, Sun, Alpha, etc.):
- Software environment[s] (e.g., UNIX, NT OS/2):
- Communications/network environment[s] (e.g., Novell, DCE, World Wide Web, etc.):
- Do you plan to use object technology? If yes, in what way?
- What other new technologies do you expect to use?

H. How do you expect to implement this application change, that is, will you use:

- Custom software development

  Using in-house staff _____

  Using vendor staff ____

  Using a mixture of in-house and vendor staff ____

- Software package

  Off the shelf, with few modifications ___

  With many modifications ___

  Which packages are being considered?

- Systems integration (i.e., where an outside supplier supplies a full business solution)
- Outsourcing
- Other

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I. Approximately how much do you expect this new/revised application to cost? [Use ranges below as prompts, of necessary.]

Under $100,000 ____ $1 - $5M _____

$100K - $500K _____ $5 - $10M _____

$500 - $1M _____ Over $10M_____

Does this amount include/exclude hardware? If included, about what percent would be for hardware? ____%

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